

ABSTRACT

An apparatus and method for adjusting the orientation of a surgical viewing instrument, which may be used to view a patient target site and any intervening tissue from outside the body, as the position of the instrument is changed by a user. The instrument is attached to a robotic arm assembly and is movable by both the user and the robot. As the user moves the instrument to a different position, the robot automatically corrects the orientation of the instrument to maintain a viewing trajectory defined by the axis of the instrument and a target coordinate in the patient target site. In another aspect there is an apparatus and method for using a surgical robot and attached ultrasound probe to track a moving target in a patient's body. The ultrasound probe has a pressure sensor in its tip, which is maintained in contact with a tissue surface at a specific location at a constant pressure. Subject to this constraint, the robot is directed to adjust the orientation of the probe, as the target point moves, to maintain the axis of the probe in line with the target point.